

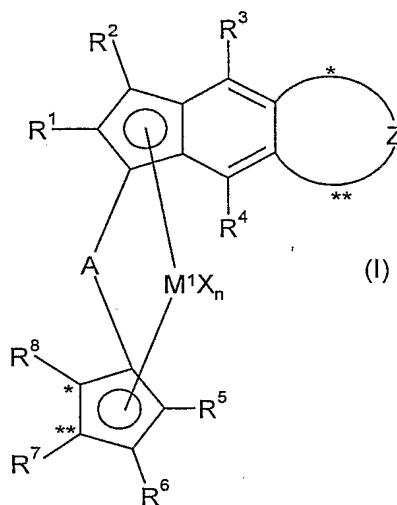
We claim:

1. An organometallic transition metal compound of the formula (I)

5

10

15



where

M¹ is an element of group 3, 4, 5 or 6 of the Periodic Table of the Elements or the
20 lanthanides,

the radicals X are identical or different and are each an organic or inorganic radical, with
two radicals X also being able to be joined to one another,

25 n is a natural number from 1 to 4,

Z is a divalent organic group which has from 1 to 40 carbon atoms and together
with the two carbon atoms of the indenyl system forms a saturated or
unsaturated, substituted or unsubstituted ring system having a ring size of from 4
30 to 12 atoms, where Z within the ring system fused to the indenyl system may also
contain one or more, identical or different heteroatoms selected from the group
consisting of Si, Ge, N, P, O, S, Se and Te,

R¹ is hydrogen or an organic radical having from 1 to 40 carbon atoms,
35

R² is hydrogen or an organic radical having from 1 to 40 carbon atoms,

R³ is hydrogen, halogen or an organic radical having from 1 to 40 carbon atoms,

40 R⁴ is hydrogen, halogen or an organic radical having from 1 to 40 carbon atoms,

R⁵ is hydrogen or an organic radical having from 1 to 40 carbon atoms,

R⁶ is hydrogen or an organic radical having from 1 to 40 carbon atoms,

5 R⁷, R⁸ are identical or different and are each hydrogen or an organic radical having from 1 to 40 carbon atoms or R⁷ and R⁸ together with the atoms connecting them form a monocyclic or polycyclic, substituted or unsubstituted ring system which has from 1 to 40 carbon atoms and may also contain heteroatoms selected from the group consisting of the elements Si, Ge, N, P, O, S, Se and Te,

10 A is a bridge consisting of a divalent atom or a divalent group,

and

15 if R³ is hydrogen, then R⁵ is an organic radical which has from 3 to 20 carbon atoms and is branched in the α position and R⁶ is hydrogen.

2. An organometallic transition metal compound of the formula (I) as claimed in claim 1

20 in which

R² is hydrogen,

25 R⁵ is an organic radical which has from 3 to 20 carbon atoms and is branched in the α position,

R⁶ is hydrogen,

30 R¹ and R⁵ are different and

M¹, X, n, Z, R¹, R³, R⁴, R⁷, R⁸ and A are as defined for the formula (I).

3. An organometallic transition metal compound of the formula (I) as claimed in claim 1 or 2

35 in which

R², R⁶ are each hydrogen,

40 R³ is a substituted or unsubstituted C₆-C₄₀-aryl radical or C₂-C₄₀-heteroaromatic radical containing at least one heteroatom selected from the group consisting of O, N, S and P, or R³ is a C₁-C₄₀-alkyl radical,

R⁴ is hydrogen, fluorine, C₁-C₁₀-alkyl, a substituted or unsubstituted C₆-C₄₀-aryl radical, or C₂-C₄₀-heteroaromatic radical containing at least one heteroatom selected from the group consisting of O, N, S and P,

5

R⁷, R⁸ together form a divalent organic group T having from 1 to 40 carbon atoms, where T together with the two carbon atoms of the cyclopentadienyl ring forms a saturated or unsaturated, substituted or unsubstituted ring system which has a ring size of from 5 to 7 atoms, where T within the ring system fused to the cyclopentadienyl ring may also contain one or more, identical or different heteroatoms selected from the group consisting of Si, Ge, N, P, O, S, Se and Te,

10

and

15

M¹, X, n, R¹, R⁵, Z and A are as defined for the formula (I).

4. An organometallic transition metal compound of the formula (I) as claimed in any of claims 1 to 3

20

in which

M¹ is Ti, Zr or Hf,

n is 2,

25

R¹ is hydrogen or an organic radical which has from 1 to 20 carbon atoms and is unbranched in the α position,

R³ is a substituted or unsubstituted C₆-C₄₀-aryl radical and

30

R⁵ is an organic radical which has from 3 to 20 carbon atoms and is branched in the α position

and the other variables and indices are as defined for the formula (I).

35

40

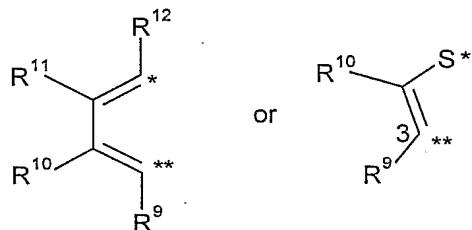
5. An organometallic transition metal compound of the formula (I) as claimed in any of claims 1 to 4

in which

5

R^7, R^8 together form

10



15

where

20

R^9, R^{10}, R^{11} and R^{12} are identical or different and are each hydrogen, halogen or an organic radical having from 1 to 40 carbon atoms or two adjacent radicals R^9, R^{10} and/or R^{11} together with the atoms connecting them form a monocyclic or polycyclic, substituted or unsubstituted ring system which has from 1 to 40 carbon atoms and may also contain heteroatoms selected from the group consisting of the elements Si, Ge, N, P, O, S, Se and Te, and

25

A is a substituted silylene group or a substituted or unsubstituted ethylene group,

and

the other variables and indices are as defined for the formula (I).

30

35

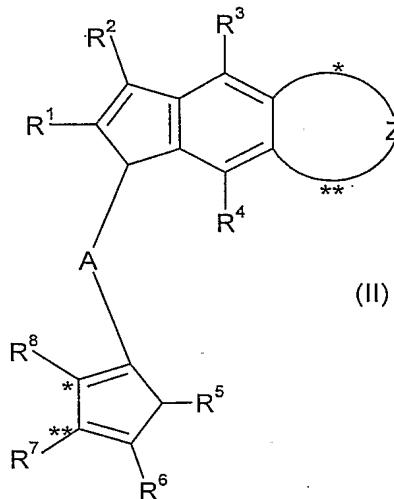
40

6. A biscyclopentadienyl ligand system of the formula (II)

5

10

15



or its double bond isomers,

where the variables R¹, R², R³, R⁴, R⁵, R⁶, R⁷, R⁸, Z and A are as defined for the formula (I).

20 7. A catalyst system for the polymerization of olefins, which comprises at least one organometallic transition metal compound as claimed in any of claims 1 to 5 and at least one cocatalyst which is able to convert the organometallic transition metal compound into a species which is polymerization-active toward at least one olefin.

25 8. A catalyst system as claimed in claim 7 which further comprises a support.

9. A process for preparing polyolefins by polymerization or copolymerization of at least one olefin in the presence of a catalyst system as claimed in claim 7 or 8.

30 10. The use of a biscyclopentadienyl ligand system as claimed in claim 6 for preparing an organometallic transition metal compound.

11. A process for preparing an organometallic transition metal compound, which comprises reacting a biscyclopentadienyl ligand system as claimed in claim 6 or a bisanion prepared therefrom with a transition metal compound.

35